

Amendments to the Drawings:

The attached sheets of drawings include changes to Figures 3, 6B, 6C, and 7A. These sheets, which include Figures 3, 6B, 6C, 7A and 7B, replace the original sheets including Figures 3, 6B, 6C, 7A and 7B.

Attachments: Replacement Sheets

REMARKS

Claims 1-8, 10, 11, and 13-21 will be pending upon entry of the present amendment. Claims 1, 2, and 11 are amended, claims 9 and 12 are cancelled, and new claims 13-21 are submitted herewith. No new matter has been added with the present amendment.

Applicant thanks the Examiner for indicating the allowability of the subject matter of claim 5. Applicant has not amended claim 5 nor made substantive amendments to its base claim in this response because the Applicant believes, for the reasons detailed below, that the parent claim from which claim 5 depends is allowable over the cited art.

New claims 13-20 are fully supported by the specification as originally filed. In particular: support for claims 13, 14, and 18 may be found, for example, in Figure 8 and the accompanying text, beginning at page 10, line 8; claim 15 finds support at least in the top view of the valve plate 124 of Figure 7A, which clearly shows that the central axis of each of the hold-down cylinders 126 lies in a plane that is substantially perpendicular to the page and thus also to the surface 151 of the valve plate, as recited in claim 15; support for claim 16 may be found in Figures 9 and 10; support for claim 17 may be found in Figures 9 and 10 and the accompanying text beginning at page 11, line 12; support for claim 18 may be found in Figures 9 and 10 and the accompanying text beginning at page 11, line 19; support for claim 20 may be found, for example, in Figure 6C and the accompanying text, beginning at page 12, line 11; and claim 21 is supported in Figures 6A-6C.

The specification has been amended to provide descriptive support for new claims 15, 16, and 20. The added text describes features that are clearly shown in the figures and is thus fully supported by the specification as originally filed. Figures 6B, 6C, and 7A have been amended to include reference numeral 151, which is used in the newly added text. Figure 3 and the accompanying text on page 2 have been amended to replace the reference numeral 153 with the numeral 103, inasmuch as 153 is used elsewhere in the specification and figures with reference to a surface of the reaction plates. Additionally, the sectional hatching of Figure 6B has been modified to more clearly define the elements shown, and to conform to the hatching of Figure 6C.

Rejections Under 35 U.S.C. § 112, Second Paragraph

Claims 2 and 12 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to point out and distinctly claim the subject matter which the Applicant regards as his invention. In particular, the Office Action points to the terms “around” in claim 2 and “the first plurality” in claim 12. Accordingly, claim 2 and the text of claim 12 have been amended to address these matters.

Claim 1 has been amended to more clearly define the valve plate recited therein. This amendment is not made to overcome prior art, and so does not narrow the scope of the claim available under the doctrine of equivalence. Claim 12 has been cancelled and the subject matter added to claim 11.

Summary of Rejections Under 35 U.S.C. §§ 102 and 103

Claims 8 and 9 are rejected under 35 U.S.C. §102(b) as being anticipated by Whalmark (U.S. Patent 3,233,555); claims 1-4, 6, and 7 are rejected under 35 U.S.C. §103(a) as being unpatentable over Whalmark, in view of Forster (U.S. Patent 4,893,549); and claims 10-12 are rejected under 35 U.S.C. §103(a) as being unpatentable over Whalmark in view of Forster and Schauer (U.S. Patent 3,382,813).

In the discussion that follows, when a specific passage of a U.S. patent is cited, it will be pinpointed by a column number separated from a line number by a colon, e.g., 4:22, indicating column 4, line 22.

Response to Rejections Under 35 U.S.C. § 102

Wahlmark fails to anticipate “first and second reaction plates coupled to the back plate, each having a convex reaction surface substantially facing, and spaced a selected distance from, the concave surface of the back plate,” as recited in claim 8. The Office Action points to the upper portion of the channel 64 (designated by Wahlmark as tracks 69, *see* 5:16) as corresponding to the convex reaction surface of claim 8. However, Wahlmark’s tracks 69 do not face the arcuate base surface 72, as would be necessary to meet the language of the claim. Wahlmark states that “the axes 115 of the sockets 67 in which the ball bearings 63 are seated are inclined in a manner shown in Figure 3. Accordingly, when hydraulic fluid under charging

pressure initially enters the lubricant conduits 85, it urges the ball bearings 63 outwardly in their sockets 67” *Wahlmark*, 7:23-27.

It can be seen, with reference to Figure 3, that the sockets 67 are inclined at an angle of about 60° from perpendicular, relative to the base surface 72, and that the tracks 69 are inclined at a reciprocal angle so as to squarely receive the force of the ball bearings 63. One of ordinary skill in the art will recognize that the “reaction surface” of Wahlmark’s track 69 is centered at the point where the force of the ball bearing is applied, i.e., on the axis 115, and that the track, therefore, does not face the base surface, but is inclined with respect thereto. Even if a very minute portion of the track extends around its arc far enough to substantially face the base surface, this small portion, alone, cannot be considered the reaction surface, to the exclusion of the remainder of the track. Thus, Wahlmark does not anticipate “a convex reaction surface substantially facing ... the concave surface of the back plate,” as recited in claim 8, which is therefore allowable.

Response to Rejections Under 35 U.S.C. § 103

Claim 1 recites, in part, “a back plate ...; a plurality of reaction plates rigidly coupled to the back plate; a valve plate ...; and a plurality of hold-down pistons positioned in respective hold-down cylinders formed in the valve plate, each of the hold-down pistons configured to be biased, by pressurized fluid in the respective hold-down cylinder, against a surface of one of the reaction plates.” A combination of Forster with Wahlmark is inappropriate for a rejection of claim 1, and also fails to teach or suggest the limitations of the claim. The Office Action states that it would have been obvious to have modified Wahlmark “by implementing hold-down pistons into the valve plate in order to bias the valve plate towards the back plate.”

Applicant respectfully disagrees. First, Wahlmark does not have a need for pistons or any other element to “bias the valve plate towards the back plate” inasmuch as its port plate 62 (i.e., valve plate) does not generate a net lifting force. Wahlmark states that “[t]o prevent separation of the plate 62 from the base 72 of the channel 64, the total bearing surface area of the outer bearing face 71 on the port plate ... is calculated so that the fluid pressure forces tending to separate the port plate from the base surface 72 of the channel 64 are reduced to

slightly less than the force exerted on the port plate 62 by the cylinder barrel 100.” *Id.*, 7:7-16. While Wahlmark’s ball bearings 63 do provide a downward biasing force against the tracks 69, this is for the purpose of seating its port plate 62 against the base surface 72 at the outset of pump operation (*see Wahlmark*, 7:19-28), and is a transitory effect. This is because, during normal pump operation, the ball bearings 62 rotate in their sockets as the pump angle changes, which allows fluid, which would otherwise exert the biasing force, to escape around the bearings to lubricate the bearings. Apart from this initial seating of the port plate, Wahlmark has no need of a biasing force. There is no motivation to seek a solution to a nonexistent problem.

Second, Forster does not teach or suggest reaction plates, so the teaching of reaction plates must come from Wahlmark. Accordingly, to adopt Forster’s pistons 15, they must be used with Wahlmark’s track 69. It can be seen in each of the embodiments shown that the portions of Forster’s pistons 15 that contact the bores 17 are spherical in shape. Because the piston rods 16 are anchored for rotation at the pivot axis S (*see Forster*, 4:44, 45 and Figure 1), the pistons are maintained in a substantially perpendicular relationship with the carriage 6. However, if Wahlmark’s ball bearings were replaced with Forster’s pistons, they could not be anchored at their upper end as taught by Forster, but instead their pper ends would be required to slide in the track 69, and there would be nothing to prevent them from flopping over because of the lateral forces. Accordingly, one of ordinary skill would not be motivated to combine Forster with Wahlmark.

Third, Wahlmark’s ball bearings are primarily for friction reduction and to prevent lateral play and rotation (*see Wahlmark*, 5:3-7, 25-32, and 66-6:19). Forster teaches that “[t]he axes of piston rods 16 of support pistons 15 are parallel with the axis of rotation Z of the cylindrical drum 5 and are located in a common plane with the axis of rotation Z.” *Id.*, 4:13-16. Wahlmark would be rendered “unsatisfactory for its intended purpose” by such pistons, inasmuch as they would be useless to reduce friction of movement of its plate 62 over the base surface 72, and would be totally ineffective at controlling lateral play and rotation of the plate (*see MPEP § 2143.01 V. (“The proposed modification cannot render the prior art unsatisfactory for its intended purpose”)*). Thus, in exchange for a solution to a problem that Wahlmark doesn’t have, the advantages provided by its ball bearings would be lost.

Finally, even if one were motivated to combine elements of Forster with Wahlmark, the resulting structure would not teach or suggest the limitations of claim 1, absent the present application and claims as a template, which is impermissible. As demonstrated above, replacing Wahlmark's ball bearings with Forster's pistons would be ineffective and mechanically unreliable. Thus, a more reasonable combination would comprise Forster's pistons and piston rods, anchored at the pivot axis S as taught by Forster, to provide the advantages of Forster, e.g., the more compact actuation, fluid supply through the pistons, etc., with separate ball bearings arranged as taught by Wahlmark, in order to obtain the advantage they provide, e.g., friction reduction, control of lateral play, etc. However, such a combination does not teach or suggest the limitations of claim 1.

For at least the reasons outlined above, claim 1 is allowable over the art of record.

With regard to claim 2, Applicant notes that Wahlmark teaches that its maximum displacement angle is 20 degrees (3:59, 60), while claim 2 recites an arc *exceeding* 20 degrees of rotation, and is thus allowable over Wahlmark.

Claim 4 recites, "at least one of the hold down pistons distributed along the first edge of the valve plate is in fluid communication with the first fluid feed channel and at least one of the hold-down pistons distributed along the second edge of the valve plate is in fluid communication with the second fluid feed channel." The Office Action points to Forster as teaching this limitation. However, Wahlmark teaches away from such a combination. In a case where Wahlmark's displacement control unit 59 is centered, "the ball bearings 63 are constantly lubricated through lubrication conduits 85 in the port plate 62 extending from the inlet passage 80 to each ball bearing socket 67" (*id.*, 5:56-59), while, if the displacement control unit 59 is offset so as to create an increased torque to the port plate 62, all of the ball bearings 63 are lubricated from the high-pressure outlet passage 81 (*see id.*, at 6:1-19). One of ordinary skill will recognize that lubricating with high-pressure fluid will force more fluid around the ball bearings as they roll. Thus, unless the added lubrication is necessary, as explained in the cited passage, it is more economical to use low-pressure fluid to lubricate all of the bearings, and thus minimize the loss of fluid. On the other hand, if the added lubrication *is* necessary, it will be necessary for *all* of the bearings, not just those on one side. Thus, in neither case would it be reasonable to lubricate one side with high-pressure fluid and the other with low-pressure fluid, as taught by

Forster. Accordingly, Wahlmark teaches away from a combination with Forster, and claim 4 is therefore allowable.

The Office Action points to Forster's Figure 3, in combination with Wahlmark, as teaching "hold-down pistons [comprising] an aperture passing along a central axis from a first surface to a second surface thereof," as recited in claim 6. Applicant disagrees. Even if a combination of Forster with Wahlmark were possible, and if such a combination resulted in pistons biased against a surface of reaction plates, which Applicant disputes, such an arrangement could not be used to provide channels through the pistons to transmit feed and discharge fluid, as taught by Forster (*see* 4:49-53), because the upper ends of the pistons would slide along the reaction plates as the displacement angle changed, and there would be no way to create a fluid path through the pistons. Thus, Forster cannot provide a motivation to create such channels because the purpose for which they are used by Forster cannot be applied to Wahlmark. Accordingly, claim 6 is allowable over the art of record.

While the scope of claim 10 differs from that of claim 1, claim 10 is allowable for many of the reasons outlined in support of the allowability of claim 1. In particular, it has been amply demonstrated that Forster and Wahlmark cannot be combined. Furthermore, the Schauer reference is significantly different in structure from both the Forster and the Wahlmark references, and cannot be combined therewith. Schauer is a species of swash-plate machine, in which displacement is controlled by changing the angle of the plate 63 against which the pistons operate, with the angle of the cylinder barrel 25 being fixed. On the other hand, Forster and Wahlmark are each directed to bent-axis type machines, in which displacement is controlled by changing the angle of the cylinder barrel, with the angle of the *plate* being fixed. Because of these distinctions, Schauer does not have anything resembling a sliding valve plate nor a back plate, because these elements are employed to change the angle of the cylinder barrel, which, in Schauer, is fixed. Accordingly, the teachings of Schauer are inapposite to the structures of Forster and Wahlmark. Claim 10 is allowable because there is no reasonable combination of references that teaches or suggests the limitations thereof.

With regard to the new claims 13-20, Applicant believes that each of these claims is allowable on its own merits over the art of record.

Conclusion

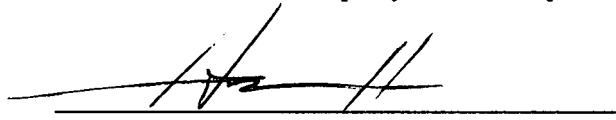
Overall, the cited references do not singly, or in any motivated combination, teach or suggest the claimed features of the embodiments recited in independent claims 1, 8, and 10, and thus such claims are allowable. Applicant's decision not to separately argue the allowability of each of the dependent claims is not to be construed as an admission that those claims not argued here would not be allowable but for their dependence on allowable base claims, and Applicant reserve the right to present such arguments as may become necessary in the future. If the undersigned representative has overlooked a relevant teaching in any of the references, the Examiner is requested to point out specifically where such teaching may be found.

In light of the above amendments and remarks, Applicant respectfully submits that all pending claims are allowable, and therefore respectfully requests that the Examiner reconsider this application and timely allow all pending claims. Examiner Bertheaud is encouraged to contact Mr. Bennett by telephone at (206) 694-4848 to discuss the above and any other distinctions between the claims and the applied references, if desired. If the Examiner notes any informalities in the claims, he is encouraged to contact Mr. Bennett by telephone to expeditiously correct such informalities.

The Director is authorized to charge any additional fees due by way of this Amendment, or credit any overpayment, to our Deposit Account No. 19-1090.

Respectfully submitted,

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Enclosures:

4 Sheets of Replacement Drawings (Figs. 3, 6B, 6C, 7A and 7B)

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